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RESEARCH

Longevity record for the large-billed tern *Phaetusa simplex*

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Abstract
The large-billed tern *Phaetusa simplex*, is a South American species that breeds mostly inland on sandy river bars. While common, little is known about its demography. A nestling banded in July 2011 in a breeding colony on the Cuiabá River, in the Brazilian Pantanal, was recovered after 13 years and two months. It was found near another breeding colony 73 km upstream from where it hatched, setting a new longevity record for the species.

Keywords Aquatic birds · Brazil · Conservation · Pantanal

The large-billed tern *Phaetusa simplex*, occurs throughout most of South America east of the Andes (Gouvêa et al. 2023), with incidental records in southern North America and Central America (Gochfeld et al.2020). Two subspecies are recognized: *P. s. simplex* and *P. s. chloropoda*. The former is distributed in northern South American (Colombia, Venezuela and Trinidad and Tobago), with its southern limit in the Amazon, and is considered extinct in western Ecuador (BirdLife International 2024). The latter subspecies occurs in Central and Eastern Brazil, from the state of Mato Grosso to the Atlantic Ocean coast of the state of Espírito Santo, as well as southward in the Paraguay and Paraná river basins, to Argentina (Antas et al.2016; Gochfeld et al.2020). The species' breeding colonies are located in four main regions of South America during the period of lowest local rainfall (from May through October in the continent´s Southern Hemisphere, December through April in its Northern Hemisphere, with regional variations) when rivers and lakes sandy bars are exposed after staying underwater during the wet season. Possible intra-tropical migration is not yet well established for the large-billed tern, with conflicting information in the literature. The abundance of the species is known to vary throughout the year between breeding sites, indicating some type of little-known regional movement (Sick 1997; Antas et al. 2016; Gouvêa et al. 2023). Demographic knowledge, including *P. simplex* longevity, is also still incipient, with an estimated generation length of 10.6 years (BirdLife International 2024). However, there are no further published details regarding the database used to calculate this generation length.

On 7 October 2024, during a banding expedition, a previously banded adult large-billed tern (CEMAVE ring M24544) was captured by night in a 12m long, 61mm mesh mist net set up nearby a breeding colony located in the Mimoso Area east of Chacororé Bay (16°16'1.22"S, 55°51'50.07"W, 129 m). The site is near the border of the municipalities of Santo Antônio do Leverger and Barão de Melgaço, Southern Mato Grosso State, in the Center-West region of Brazil (Fig. 1). This individual had been banded as a nestling (*i.e.*, a chick still in the nest) on 24 July 2011, in a breeding colony at a Cuiabá River bar, known locally as Luzardo or Poção beach, located within the limits of the

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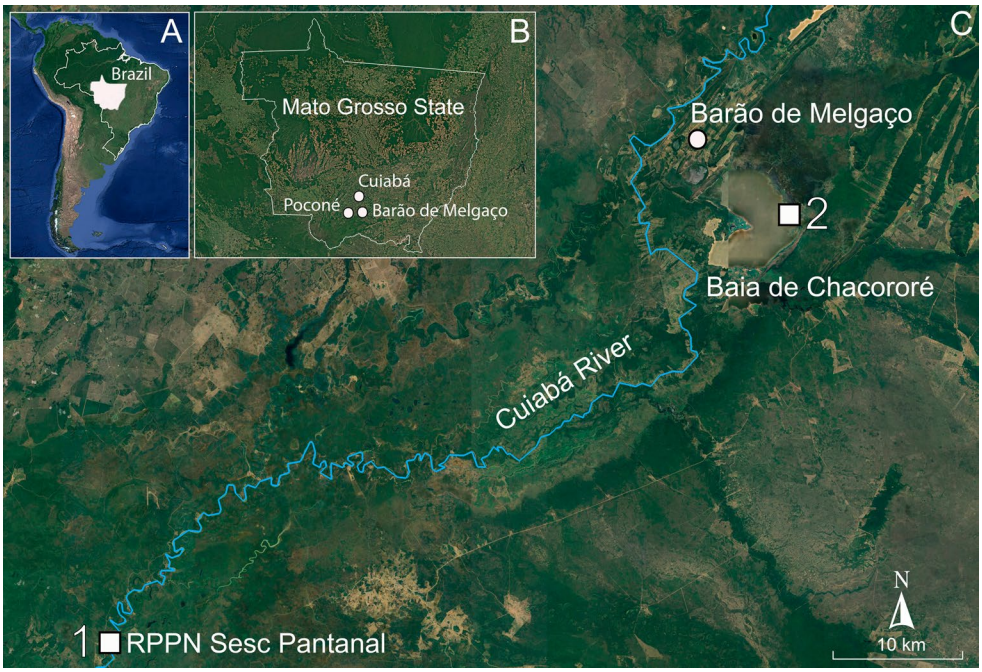

Fig. 1 Location of banding and recovery sites for the individual large-billed tern *Phaetusa simplex* after 13 years. **A** Location of Mato Grosso State (white area) in the Center-West Region of Brazil. **B** Location of the cities of Cuiabá (capital), Poconé, and Barão de Melgaço in southern Mato Grosso State. **C** Locality 1. Breeding colony at RPPN Sesc Pantanal (banding site) and 2. Breeding colony of Chacororé Bay (recovery site), both in the Cuiabá River region. City of Barão de Melgaço and Chacororé Bay (Google Earth Pro / © 2023, Image Landsat / Copernicus)

Fig. 2 Individual of large-billed tern *Phaetusa simplex* recaptured in Chacororé Bay, MT. **A** General image of the bird; **B** Detail of the band (photos: Luciana Ferreira)

Reserva Particular do Patrimônio Natural Sesc Pantanal (16°37'10.03"S, 56°27'14.99"W, 124 m), in the municipality of Poconé, also in Mato Grosso state. The recovery site is approximately 74 km (straight-line distance) from the original banding site (Fig. 1). On the date of recovery, this adult large-billed tern had the following biometric data: body mass: 217 g; total length: 405 mm; wing length: 320 mm; tail length: 118 mm; culmen length: 61.6 mm; and tarsus length: 27.2 mm (Fig. 2). At recovery, no molt was underway and its biological and physical conditions were considered visually similar to other large-billed terns also captured at the site. Both banding and recovery were carried out by the sandy bar bird colonies study project running almost continuously in the Cuiabá River region since 2002 (Antas et al.2016), in a joint field operation with the Laboratório de Ecologia de Aves of the Departamento de Botânica e Ecologia, Universidade Federal de Mato Grosso. After the data collection, this individual was released at the same spot still wearing its original band, as it had no significant wear over the years. Because the bird was captured by mist-net, it could not be immediately determined if it was breeding within the colony where it was captured.

This large-billed tern recovery after 13 years, two months and 13 days after banding represents the maximum age published for the species. Previously, another large-billed tern had been recovered after eight years, one month and 20 days (Antas et al.2016). This record also provides additional data regarding the regional displacement between the two sites, both located in the same river basin. However, the current data cannot rule out movements beyond the Cuiabá River basin. Another nestling banded on the same date and in the same colony of this current recovery, was found dead one year, six months and 10 days later, 1,483 km distant in the Salado or Juramiento River, Santa Fe Province, Argentina, a tributary of the Paraná River (Antas et al.2016), showing large-scale displacement to another river basin. This individual had probably not yet reached the possible first breeding age when recovered, estimated using demographic data of other tern species of similar size, such as the common tern *Sterna hirundo* (2-3 years – Arnold et al.2020) and gull-billed tern *Geochelidon nilotica* (5 years – Molina et al.2023). This long-distance movement may well be a result of either individual geographic dispersion or an effective seasonal migration by the Cuiabá River population or a fraction of it. Observations in the region of RPPN Sesc Pantanal detected a good number of large-billed terns in March, the peak period of seasonal flood at the site. Thus, it is well possible that at least part of the species population stays at the breeding colonies vicinity even when the bars are completely flooded (Antas et al.2016).

Another significant result of the Mimoso´s recovery was its presence in a colony other than the one where it fledged. The available recovery data do not allow us to state it was also breeding there (we did not observe the bird in the nest or with chicks), though the same data do not rule out this possibility. Large-billed tern recoveries at the RPPN SESC Pantanal colonies over the years showed some individuals breeding on different sand-bars from where they were born. However, previously, the distances were meager compared to the Mimoso individual's distance of up to 20 km and 700 m between river bars (straight line distance). In 2011, 486 large-billed terns were banded in the Cuiabá River colonies, splitted in 96 mistnetted adults, 53 mistnetted youngs, and 337 hand captured nestlings and mistnetted youngs (both latter two age classes composing the 2011 age coort). Overall, 1460 large-billed terns were banded from 2002 to 2024 (339 adults, 70 youngs and 1051 nestlings). Tweenty two recoveries of mistnetted banded individuals of three or more years (supposedly breeding adults considering their age) occurred in the Cuiabá River colonies during the species´ breeding season. Two large-billed terns recoveries at SESC`S reserve colonies showed strict banding site philopatry over time. Whether banded as a nestling (1 individual) or as an adult (1), they returned to the same breeding colony where they originally banded after 8 years, and at 4 years and 10 months, respectively. In summary, with the new Mimoso recovery, the current available data suggest individual variation in site philopatry within the banded population, in line with the itinerancy breeding hypothesis to explain the species numbers fluctuation over the years in the SESC Reserve´s colonies (Antas et al. 2016). Longevity data are essential for different studies and applications in ornithology and the conservation of species. Studies dealing with different reproductive strategies among species, as well as conservation modeling, such as the Vortex program of the International Union for Conservation of Nature (IUCN) for analyzing the population viability of species (Lacy and Pollak 2023). Demographic analyses, especially of birds with long average lifespans, require long-term studies of large, banded populations with, especially, the banding of chicks to determine the effective initial age (Weimerskirch 2001). However, the material of which bands are made also needs to be considered in such studies as some aluminum alloys can deteriorate over time if in contact with saline waters, which could affect the results of long-term studies (Cordeiro et al.1996; Antas et al. 2010).

Established demographic parameters exist for some populations of other species of the family Sternidae. Among these, the common tern, stands out due to long-tern studies developed in reproductive colonies in the Northern Hemisphere. Notable records of longevity for this species include: an individual of the Buzzard Bay colony, Massachusetts, United States, reproducing for 28 years (Nisbet et al.2020); the recovery of an individual in Brazil 26-years after it had been banded as a nestling in North America (Cordeiro et al.1996); the observation of an individual with an individual pattern of colored bands in Parque Nacional da Lagoa do Peixe 16-years after being banded (Hays et al.1997); and another bird, 12 years after being banded in a reproductive colony in the Azores archipelago, Portugal (Mestre et al.2010). The longevity record established by the recovery of the large-billed tern reported here suggests some similarity with this aspect of the common tern population dynamics. The current record also provides important basic information for the large-billed tern, as there is a general lack of studies providing demographic parameters of species that reproduce in tropical areas of the world (Weimerskirch 2001).

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Data availability No datasets were generated or analysed during the current study.

Declarations

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